The

Brewer Conference

on

Aerospace Education

a Report

"Assessing Needs...Defining Vision"

In cooperation with the National Coalition for Aviation Education

Donald J. Koranda
NAA
President and CEO

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Dear Aerospace Education Supporter:

In today's challenging environment our nation needs highly trained and technically competent people to meet the growing demands of a modern, mobile and diverse world economy. Nowhere is this need more evident, and more important, then in the aerospace industry.

A key player in our nation's economy, the aerospace industry has powered a significant portion of America's growth over the years with its technological innovations. In an incredibly short period of time we have progressed from man's first powered flight over the sand dunes of Kitty Hawk, North Carolina, to outer space and the far reaches of our solar system. It is a technological triumph that has had a profound impact on every aspect of our lives—socially, economically and politically.

To meet the challenges of the future, and to fuel our continued growth, we need an educated work force prepared to assist in man's never-ending quest for knowledge and filled with the desire to push our boundaries outward. Aerospace Education can and will play an increasingly important role in America's future, and indeed, the world's future, as we move toward that destiny. Aerospace Education can also help stimulate young minds to higher learning levels through an inherent connection to math and the sciences, and its ability to excite students with the opportunity to see things in a new light and to explore new worlds. No matter what course in life we choose, Aerospace Education will expand our students horizons, enrich our knowledge and better prepare us to assume leadership roles as citizens of a modern state.

The National Aeronautic Association, in cooperation with its partners, the Wolf Aviation Fund and the Civil Air Patrol, sponsored a meeting of aerospace educators—to discuss the challenges facing our educators in today's classroom environment. You will find among the pages of this report the reality of their environment and the significant challenges they face in obtaining the tools and support for this educational opportunity.

The Brewer Conference on Aerospace Education report is a first step in our journey towards the goal of enhanced integration of aviation and space education into the classroom environment. We must all act to keep this goal in sight, and to make it a reality. Our future depends on it.

Sincerely,

Donald J. Koranda
President/CEO
National Aeronautic Association

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Executive Summary

The National Aeronautic Association has initiated a multi-phase effort to enhance the effectiveness of the resource support of the 50+ national organizations having an active interest in aviation and space education.

The initial Frank G. Brewer Forum identified the contemporary issues and trends impacting our national education process, especially aerospace education in the schools.

An on-line survey was conducted to establish the basis for a series of questions to be addressed by a select group of educators active in aerospace education.

The participants in the Brewer Conference on Aerospace Education examined the issue of how providers of aerospace education materials can better assist educators in meeting the needs of today's students.

The teacher discussion groups concluded that there were three primary areas of concern. They are:

* The academic worth of aerospace education must be demonstrated.

* Must be assessable, grade specific and consider the established national and state standards.

* Teachers must have a way to easily identify the resources available. The establishment of a national Internet 'clearing house' including an interactive function was encouraged.

* Strong support and endorsement from within the education community, government entities and the various aerospace organizations is needed. A collaborative approach to create an accepted national 'mission' statement would enhance the role of all interested organizations.

The observers and facilitators comments supplemented the conclusions of the educator's report. It was noted that the Internet should be considered as a primary communication medium and that a clear statement of a national role for aerospace education was essential. Also, the industry needs must be clearly defined and recognize the challenges facing the nation's education community.

The preliminary report of the Brewer Conference was presented to the general assembly of the annual Congress of Aviation and Space Education with a favorable response.

The Brewer Committee is committed to continue a national dialog to facilitate and support the accomplishment of these longer range goals.

Educators' Report

On Wednesday, April 3, 2002, prior to the beginning of the National Congress on Aviation and Space Education, more than sixty educators from around the country convened in a special working group. They met to investigate how aerospace organizations can better assist and support educators in the integration of aerospace education into American classrooms. Convened as the National Aeronautics Association (NAA) "Brewer Educators' Forum," the group included classroom teachers, school administrators, organizational educators, and government representatives interested in building stronger relationships among aerospace organizations, governmental agencies, school systems and non-formal education institutions.

Forum participants discussed challenges that face educators as they attempt to integrate aerospace education into their classrooms and explored what can be done to accomplish this goal. Participants, working in small discussion groups, were tasked to answer five specific questions based on results obtained from a survey instrument nationally to educators prior to the Forum.

The questions were:

a. How do we get information about aerospace-related educational materials into the hands of educators?

b. Where do educators look for information?

c. What support mechanisms can be provided by the aerospace community that would help educators now and in the future?

d. What challenges do educators face that impede the use of aerospace-related educational materials?

e. What aerospace-related educational resources best meet the needs of educators?

The Forum discussions offered valuable insight into some of the problems of building aerospace education into our schools' programs. Examining these difficulties served as an excellent baseline for the development of an overall strategy that evolved from the Forum's work. The Forum attempted to define the problems and develop a strategic approach to promoting aerospace education in America's schools. Three distinct "pillars" evolved from these discussions, providing the structure for a bridge connecting aerospace education to tomorrow's classrooms.

The three essential pillars are:

A. Academic Worth

First, the academic worth of aerospace education must be demonstrated. The over-arching issue evolving from the discussion is that education, industry, and government policy-makers need to understand that the goals of aerospace education coincide with their own goals and objectives. Forum participants believe that once leaders fully understand the academic worth of aerospace education teachers will receive the support they need to inspire the students of our country to become the next generation of Orville and Wilbur Wrights. This process begins with the American public schools in the following ways:

1. By showing how aerospace education supports the objectives in our nation's schools. These broad objectives are:

   a. to produce qualified graduates at every level;
   b. to produce productive members of society;
   c. to produce well-informed citizens who make intelligent decisions about national issues;
   d. to produce citizens of high moral character.

2. By demonstrating that the integration of aerospace education into schools will support the objectives of the U.S. Government. Emphasis on aerospace education can:

   a. help build a source of employees to sustain a strong industrial base for governmental, commercial, military aviation development and space exploration;

   b. help build public support to maintain aerospace power to further American's security interests around the globe.

3. By stressing that aerospace education equally supports the needs of the United States aerospace-related industries. The educational community can:

   a. inspire youth to pursue careers in aerospace-related fields through cooperative education and training agreements among government, education, and industry, such as the *School-to-Career* program.

   b. offer educational programs aligned with the needs of industry to produce qualified graduates who can contribute to the knowledge, support, and productivity of associated firms and organizations;

B. Educational Resources

There are myriad aerospace education resources available throughout the country, in a variety of media from numerous organizations. However to be useful these educational resources must:

1. comply with national academic standards in multiple disciplines;
2. support goals and objectives of standardized testing;
3. be current, easily accessible, and relatively inexpensive;
4. include motivational and practical activities to enhance the core curriculum;
5. provide comprehensive, grade-level specific K-12 programs;
6. include recognition and rewards for aerospace achievement in the classroom.

In addition, these educational resources must go beyond simple lesson plans, to include some of the following features:

1. informational and interactive websites;
2. resource centers or centralized locations for dissemination of materials;
3. professional development, with associated college equivalency credit, to include follow-on classroom support for teachers;
4. multi-media productions
5. supplemental readings of educational journals and instructional magazines;
6. guest speakers, presenters, resource persons;
7. off-campus tours, fieldtrips, and orientation flights;
8. grants and scholarships for students and teachers;
9. on-the-job training for students and teachers;

10. all-inclusive instructional kits;

11. opportunities for young people to become involved in aviation-education programs offered by many organizations such as the Civil Air Patrol, NASA, AFROTC, FAA, AMA and EAA.

Finally, these educational resources must be included in a regularly updated, centralized aerospace network to:

1. establish a national aerospace educator database to support aerospace education teachers, identifying contact information for mentor aerospace educators who are available throughout the United States;

2. develop a national clearinghouse of all aerospace educational organizations with a matrix of resources, networking opportunities, websites, scholarships, grants, professional development, speakers and fieldtrips.

C. Organizational Endorsement and Support

Educational and aerospace organizations must develop a collaborative approach to create a mutually supportive national mission statement to enhance the efforts of all organizations. The participants in this national venture must believe that it is important to have strong support and endorsement from the following entities:

1. leaders of education systems at national, state, and local levels;

2. governmental entities such as branches of the U.S. Military, NASA, Civil Air Patrol, FAA, and state departments of aviation;

3. educational and aerospace associations such as the National Science Teachers Association, the National Aeronautic Association, the Academy of Model Aeronautics, the Experimental Aircraft Association, the Space Foundation, Challenger Centers, the National Rocketry Association, the National Business Aviation Association, the Air Force Association and the Aerospace Education Foundation, the Aircraft Owners and Pilots Association and the Centennial of Flight Commission;

4. aerospace industries such as TRW, Boeing, Cessna, General Dynamics, Pratt and Whitney and General Electric, to name just a few.

The conference participants believe that when aerospace education can stand as a viable and respected academic discipline and serve as a common thread interwoven into all aspects of history, math, science, language arts, and economics, and information technology. The Brewer Conference follow-on can help initiate a collective endeavor to promote aerospace education in the classrooms of America. Our first step has been the development of a strategic vision as outlined here. Many additional steps will be necessary to build a plan with subordinate goals, objectives, benchmarks, and resources to support the elements identified through the conference initial effort. The participants were charged with the task of investigating how to advance an aerospace education mission in the classrooms of the United States, and the first step has been accomplished.

* * *

This summary was based on an original report presented at NCASE by the following NAA Brewer Education Forum members: Susan Mallett (Elementary School Principal, Montgomery, AL), Jeanne MacPherson (Chief: Safety and Education, Montana Transportation Department), and Judy Sink (Second Grade Teacher, Boone, NC).

Observers and Facilitators Comments

The participants were diverse, knowledgeable and enthusiastic in addressing the agenda topics. Their conclusions were supported by many good suggestions.

The pre-conference survey response was consistent with experience.

The value of aerospace education would be enhanced if there was more agreement on the message being sent to the education community.

The promotion of aerospace education sometimes does not consider broader education goals as determined by federal and state requirements.

Standards are now a very significant concern for teachers. National and state standards do not include aerospace education concepts. The challenge is to find ways to integrate these concepts into the existing curricula.

A clearly defined national goal for aerospace education would help reduce the current "hodge-podge" of information and materials. It would facilitate an improved focus and the communications reaching teachers.

The value of the Internet and other technologies were recognized. Some good Web sites are available, but unknown to most teachers. A national source of information or "clearinghouse" was a common interest expressed by most participants. Suggestions included an interactive web site where a teacher could get answers to specific questions, on-line descriptions of web sites available, peer reviews of materials and resources, a teacher bulletin board and sponsorship of a special teachers network.

The dissemination of aerospace education information and materials to local libraries would be very advantageous for teachers.

All information and materials must be compatible with curriculum and up to date. Also, they become much more useful if grade or age level articulation is included. More hands-on materials are needed.

The aerospace industry must consider what educators need, while clarifying what they want from the education community.

More emphasis is needed to develop communication channels with school administrators.

Professional development opportunities in aerospace education might include a "beginner's background kit", formalizing a "master aerospace education teacher" designation and more advanced workshops with an emphasis upon peer leadership and mentoring.

Increased financial support for teacher professional development would be welcome with more opportunities for "real life" aerospace related experiences.

Partnerships within the community with aviation related organizations should be explored. Media coverage of a school's aerospace education activities would provide visibility, possibly leading to new support.

Conclusions and Recommendations

The Brewer Conference provided considerable insight into the contemporary views, needs and wants of educators with an active interest in aerospace education. There is widespread agreement within this group that Aerospace education has the potential of enriching the curriculum in the nation's schools, provided that the needs of the teachers and the national/state standards to which they must teach are carefully considered.

In this context the following two principles would apply:

1) The academic worth of aerospace education must be clearly established. The aerospace industry and related associations should understand the premise that aerospace education is a means to sharing in a common goal of improving the education process...not as an end in itself.

2) The above must have a well-defined focus supplemented by effective communication and 'delivery' systems supported by the provider organizations. Quality information and resource assistance is a definite requirement.

The Brewer Committee recommends continuation of the process to address an enhanced future role for aerospace education in or related to the overall school curriculum.

An invitation should be extended to all segments of the aerospace industry, related associations, government and educational organizations, to participate in a national forum to enhance the value and recognition of aerospace education as a means for improved student orientation and performance.

The challenge would be to consider:

1. The development of a vision statement that could be supported by a broad coalition of aerospace industry members, associations, government and education organizations.

2. The establishment of national goals to help focus industry efforts on the positive benefits of aerospace education and to bring about better coordination of local, state and national aerospace programs.

3. Mechanisms by which an improved collaborative effort on the part of industry, government, and education organizations could focus the nation's educators on the value of aerospace education as a tool to motivate, inspire, and teach.

4. Actions to insure the quality of aerospace education resources being offered.

5. A highly visible campaign to create a significant awareness among educators as to the benefit or value of incorporating aerospace concepts into the education process.

The Brewer Committee is committed to continue a national dialog to facilitate and support the accomplishment of these longer range goals.

Annex 1

Issues and Trends Impacting the Education Process

The following is a digest of the issues and trends facing today's teachers and schools as identified in the Report of the Frank G. Brewer Forum on Aerospace Education.

1. Society is experiencing a dynamic period of rapid change. Public access to rapid transportation and communication are on the forefront of global concerns and change. Life is becoming more complex with increasing demands upon personal time.

2. Four defined generations now share the workplace and also many volunteer activities. Each generation differs in their values, concerns and work styles.

3. Students and young adults are quite comfortable, if not dependent upon computer and electronic technology.

4. All levels of education have an expanding scope of obligation in their primary charge to educate young people.

5. Schools are being required to add curriculum content and increased standardized testing. This is taking away the teacher's flexibility making it more difficult to add aerospace education concepts into the classroom.

6. The vast internet sources for information are becoming a supplement to traditional textbooks. There is a need to evaluate the educational value of the Web sites related to aerospace education.

7. The aviation and space industries have a growing problem in finding qualified workers. Pilots and maintenance positions have greater visibility, but a well developed knowledge of the sciences and the individual's ability to communicate, solve problems and work within a team are a high priority throughout the aviation/space industries.

8. Aerospace education is competing with other industries and special interests for the attention of educators and students.

9. There is an increase in the number of national youth programs and activities related to aviation/space education. Some are school affiliated. Availability of adult leadership to work with the young people appears to be a continuing concern.

Annex 2

Brewer Educational Forum Online Survey

During February 2002 the Brewer Educational Committee conducted an online educators' survey asking about the usefulness and availability of various resources provided by aviation and space industry firms, associations, and agencies. We present here only a few brief results. Teachers' comments regarding the full results are the most important product of this effort and are available from the NCAE Web Site listed below.

About 60% of the respondents describe themselves as classroom teachers, followed by those educators running youth programs, science centers, and such. All grade levels and 43 states were represented. Almost two thirds indicated that their state's curriculum or standards include aerospace related material, but often there were conflicting answers from within the same states, indicating some teachers were not aware of available materials. The main reasons cited for teachers not using aerospace related materials were not knowing where to find *quality* materials, not having enough time because of classroom demands, and not knowing how the materials related to the subject taught.

However, 80% of respondents rated aerospace resources easy to find, with wide differences in which sources seem most worthwhile. The Internet seemed to be the most used source of information; District resource personnel and administrators were the least used.

Educators first learned of aerospace resources in diverse ways. Workshops and conferences were rated highly important. Self-contained hands-on activity kits, CD-ROM's and videotapes, workshops and training for educators, and grants were rated the most useful. Further analysis showed results differed by grade level taught. Conferences, workshops, awards, and training seemed more valued by administrators and classroom teachers while college level educators seemed to most value web casts and chats. Informal educators valued speakers and presenters, aerospace related product and sales brochures, posters, and informal educational programs a bit more. This implies that further study might tell which different methods and materials are preferred at various educational levels.

Teachers indicated low interest in lectures by visitors but were enthusiastic about hands-on activities, demonstrations, and flying experiences for student and teachers.

Financial support from schools or districts was considered poor, especially for travel and materials. Better support was indicated for pay for substitute teachers and for continuing education. Such educational credits were deemed important. The best time cited for holding educators' conferences, workshops, and events were one-week sessions during the summer and for afternoon/evening or one-day weekend sessions during the school year.

Comments were encouraged and many were provided, yielding useful insights. Those interested in all the survey graphs and findings may view the Brewer survey files located on the NCAE website www.aviationeducation.org, in the File Library found under the Member Organizations tab.

www.aviationeducation.org

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